

Application No. 10/516,418  
Amendment and Response dated September 26, 2007

Docket No.: 60009US(49991)

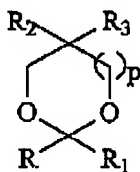
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# AMENDMENTS TO THE CLAIMS

SEP 26 2007

Please amend claims 1, 3, 4, 6, 13, 17, 18, 20-22, 28, 29 and 33 and please cancel claims 2 and 12 without prejudice or disclaimer. Please add new claim 123. The following listing of claims will replace all prior versions, and listings, of claims in the application.

1. (Currently amended) A method for enhancing ~~a chemical reaction~~ digestion, chemical alteration or a combination thereof of a biomolecule comprising contacting the biomolecule with a surfactant represented by formula I:



(I)

in which

p is 0, 1 or 2;

R is alkyl;

R<sub>1</sub> and R<sub>2</sub> are each, independently, hydrogen or methyl; and

R<sub>3</sub> is selected from -OSO<sub>3</sub><sup>-</sup>, -R<sub>4</sub>OSO<sub>3</sub><sup>-</sup>, -R<sub>4</sub>OR<sub>5</sub>SO<sub>3</sub><sup>-</sup>, and -OR<sub>5</sub>SO<sub>3</sub><sup>-</sup>;

wherein R<sub>4</sub> and R<sub>5</sub> are each, independently, lower alkyl;

to thereby enhance ~~the chemical reaction of~~ chemical digestion, chemical alteration or a combination thereof of the biomolecule.

2. (Canceled)

3. (Currently amended) The method of claim ~~[[2]]~~ 1, further comprising analyzing the biomolecule following ~~the chemical reaction~~ chemical digestion, chemical alteration or a combination thereof.

4. (Currently amended) The method of claim ~~[[2]]~~ 1, wherein the biomolecule is contained in a biological sample.

5. (Original) The method of claim 4, wherein the biological sample is selected from the group consisting of inclusion bodies, biological fluids, biological tissues, biological matrices, embedded tissue samples, and cell culture supernatants.

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6. (Currently amended) The method of claim ~~[[2]]~~ 1, wherein the biomolecule is selected from the group consisting of a protein and a peptide.
7. (Original) The method of claim 6, wherein the biomolecule is selected from the group consisting of a lipophilic protein, a receptor, a proteolytic protein, and a membrane-bound protein.
8. (Original) The method of claim 3, wherein the analysis is selected from the group consisting of solid phase extraction, solid phase micro extraction, electrophoresis, mass spectrometry, liquid chromatography, liquid-liquid extraction, membrane extraction, soxhlet extraction, precipitation, clarification, electrochemical detection, staining, elemental analysis, Edmund degradation, nuclear magnetic resonance, infrared analysis, flow injection analysis, capillary electrochromatography, ultraviolet detection, and combinations thereof.
9. (Original) The method of claim 8, wherein the mass spectrometry is surface desorption ionization mass spectrometry.
10. (Withdrawn) The method of claim 9, wherein the surfactant is not degraded prior to analysis.
11. (Original) The method of claim 9, wherein the surfactant is degraded prior to analysis.
12. (Canceled)
13. (Currently amended) The method of claim ~~[[12]]~~ 1, wherein ~~the reaction comprises chemical digestion of the biomolecule is enhanced.~~
14. (Original) The method of claim 13, further comprising contacting the biomolecule with a protease, CNBr, or hydroxylamine.
15. (Original) The method of claim 13, further comprising separating the resulting biomolecule fragments.

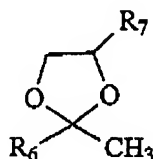
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16. (Original) The method of claim 14, wherein the protease is immobilized.
17. (Currently amended) The method of claim 14, wherein the protease is selected from the group consisting of Trypsin, Chymotrypsin, Lys-C, ~~Glu-C~~ [[1]V8 protease[1]], AspN, Arg-C, ~~S. Aureus~~, Clostripain, Pepsin, and Papain.
18. (Currently amended) The method of claim 9, wherein ~~the reaction comprises~~ chemical alteration of the biomolecule is enhanced.
19. (Original) The method of claim 18, wherein the chemical alteration is selected from the group consisting of alkylation, reduction, and a combination thereof.
20. (Currently amended) The method of claim 1, wherein the chemical digestion or chemical alteration ~~enhancement of the chemical reaction comprises~~ provides a favorable chemical property.
21. (Currently amended) The method of claim 20, wherein the favorable chemical property is selected from the group consisting of a more complete reaction, increased efficiency, increased yield, and ~~increased rate, and increased utility~~.
22. (Currently amended) The method of claim [[12]] 1, wherein the chemical reaction comprises denaturing the biomolecule, solubilizing the biomolecule, or a combination thereof.
23. (Original) The method of claim 1, further comprising degrading the surfactant after the chemical reaction.
24. (Original) The method of claim 23, wherein the surfactant is degraded by contact with an acidic solution.
25. (Original) The method of claim 1, wherein the surfactant is represented by formula II:

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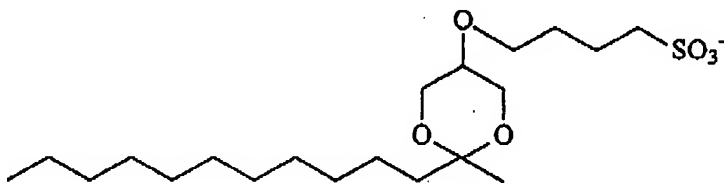
(II)

in which

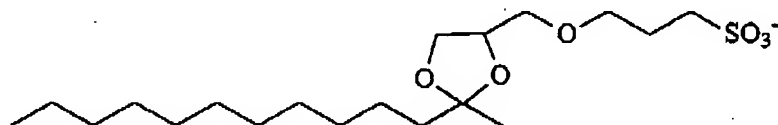
$R_6$  is alkyl;

$R_7$  is selected from  $-\text{OSO}_3^-$ ,  $-\text{R}_4\text{OSO}_3^-$ ,  $-\text{R}_4\text{OR}_5\text{SO}_3^-$ , and  $-\text{OR}_5\text{SO}_3^-$ ,  
wherein  $R_4$  and  $R_5$  are each, independently, lower alkyl.

26. (Original) The method of claim 1 wherein the surfactant has the following chemical structure:



27. (Original) The method of claim 1 wherein the surfactant has the following chemical structure:



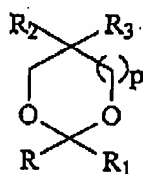
28. (Currently amended) The method of claim 1 wherein ~~the enhancement of the chemical reaction~~ chemical digestion, chemical alteration or combination thereof facilitates on-line automation, separation, mass spectrometric analysis, or a combination thereof.

29. (Currently amended) The method of claim 1 wherein the chemical digestion, chemical alteration, or combination thereof, ~~chemical reaction~~ is performed under microscale conditions.

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30. (Original) The method of claim 13 wherein the digestion occurs in an electrophoretic gel.
31. (Withdrawn) The method of claim 30 wherein the digestion occurs in the presence one or more surfactants that are different from the surfactant in Formula I.
32. (Withdrawn) The method of claim 31 wherein the digestion occurs in the presence of SDS.
33. (Currently Amended) The method of claim ~~31~~13 wherein the digestion occurs in the absence of SDS.
34. (Withdrawn) A method for analysis of a biomolecule comprising: enhancing a chemical reaction of the biomolecule by contacting a sample containing the biomolecule with a surfactant represented by the formula:



- in which  
p is 0, 1 or 2;  
R is alkyl;  
R<sub>1</sub> and R<sub>2</sub> are each, independently, hydrogen or methyl; and  
R<sub>3</sub> is selected from -OSO<sub>3</sub><sup>-</sup>, -R<sub>4</sub>OSO<sub>3</sub><sup>-</sup>, -R<sub>4</sub>OR<sub>5</sub>SO<sub>3</sub><sup>-</sup>, and -OR<sub>5</sub>SO<sub>3</sub><sup>-</sup>,  
wherein R<sub>4</sub> and R<sub>5</sub> are each, independently, lower alkyl; and  
analyzing the sample; to thereby analyze the biomolecule.
35. (Withdrawn) The method of claim 34, wherein the molecule is a biomolecule.

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36. (Withdrawn) The method of claim 35, further comprising analyzing the biomolecule following the chemical reaction.
37. (Withdrawn) The method of claim 35, wherein the biomolecule is contained in a biological sample.
38. (Withdrawn) The method of claim 37, wherein the biological sample is selected from the group consisting of inclusion bodies, biological fluids, biological tissues, biological matrices, embedded tissue samples, and cell culture supernatants.
39. (Withdrawn) The method of claim 35, wherein the biomolecule is selected from the group consisting of a protein and a peptide.
40. (Withdrawn) The method of claim 39, wherein the biomolecule is selected from the group consisting of a lipophilic protein, a receptor, a proteolytic protein, and a membrane-bound protein.
41. (Withdrawn) The method of claim 36, wherein the analysis is selected from the group consisting of solid phase extraction, solid phase micro extraction, electrophoresis, mass spectrometry, liquid chromatography, liquid-liquid extraction, membrane extraction, soxhlet extraction, precipitation, clarification, electrochemical detection, staining, elemental analysis, Edmund degradation, nuclear magnetic resonance, infrared analysis, flow injection analysis, capillary electrochromatography, ultraviolet detection, and combinations thereof.
42. (Withdrawn) The method of claim 41, wherein the mass spectrometry is surface desorption ionization mass spectrometry.
43. (Withdrawn) The method of claim 42, wherein the surfactant is not degraded prior to analysis.
44. (Withdrawn) The method of claim 34, wherein the reaction comprises chemical digestion, chemical alteration, or a combination thereof.
45. (Withdrawn) The method of claim 44, wherein the reaction comprises chemical digestion.

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in which

$R_6$  is alkyl;

$R_7$  is selected from  $-\text{OSO}_3^-$ ,  $-\text{R}_4\text{OSO}_3^-$ ,  $-\text{R}_4\text{OR}_5\text{SO}_3^-$ , and  $-\text{OR}_5\text{SO}_3^-$ ,  
wherein  $R_4$  and  $R_5$  are each, independently, lower alkyl.

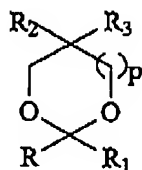
Claims 46-61. (Canceled)

62. (Withdrawn) The method of claim 45 wherein the digestion occurs in an electrophoretic gel.

63. (Withdrawn) The method of claim 62 wherein the digestion occurs in the presence of SDS.

64. (Withdrawn) The method of claim 62 wherein the digestion occurs in the absence of SDS.

65 (Withdrawn) A kit for enhancing a chemical reaction of a molecule comprising:  
a surfactant represented by formula I:



(I)

in which

$p$  is 0, 1 or 2;

$R$  is alkyl;

$R_1$  and  $R_2$  are each, independently, hydrogen or methyl; and

$R_3$  is selected from  $-\text{OSO}_3^-$ ,  $-\text{R}_4\text{OSO}_3^-$ ,  $-\text{R}_4\text{OR}_5\text{SO}_3^-$ , and  $-\text{OR}_5\text{SO}_3^-$ ,

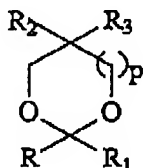
wherein  $R_4$  and  $R_5$  are each, independently, lower alkyl; and instructions for use.

Claims 66-94. (Canceled)

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95. (Withdrawn) A method of capturing a lipophilic compound comprising contacting a lipophilic compound with a surfactant represented by the formula:



in which

p is 0, 1 or 2;

R is alkyl;

R<sub>1</sub> and R<sub>2</sub> are each, independently, hydrogen or methyl; and

R<sub>3</sub> is selected from -OSO<sub>3</sub><sup>-</sup>, -R<sub>4</sub>OSO<sub>3</sub><sup>-</sup>, -R<sub>4</sub>OR<sub>5</sub>SO<sub>3</sub><sup>-</sup>, and -OR<sub>5</sub>SO<sub>3</sub><sup>-</sup>;

wherein R<sub>4</sub> and R<sub>5</sub> are each, independently, lower alkyl; and degrading the surfactant to produce a hydrophobic compound; to thereby capture the lipophilic compound.

96. (Withdrawn) The method of claim 95, wherein the lipophilic compound is contained in a sample.

97. (Withdrawn) The method of claim 96, wherein the sample comprises a biological sample.

98. (Withdrawn) The method of claim 95, wherein the product of degradation is compatible with mass spectrometric detection, high performance liquid chromatography analysis, and with protease activity.

99. (Withdrawn) The method of claim 95, wherein the lipophilic compound is a protein fragment or peptide.

100. (Withdrawn) The method of claim 99, wherein the protein fragment is generated by chemical digestion or a combination of chemical alteration and chemical digestion.



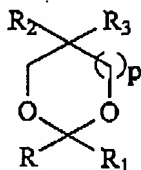
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101. (Withdrawn) The method of claim 100, wherein the wherein the protein fragment or the peptide is the product of a protein that has been digested by contact with a protease and the surfactant of formula I.

Claims 102-105. (Cancelled)

106. (Withdrawn) A method for enhancing surface desorption ionization analysis of a molecule comprising: contacting the molecule with a surfactant represented by the formula:



in which

**p is 0, 1 or 2;**

**R is alkyl;**

**R<sub>1</sub> and R<sub>2</sub> are each, independently, hydrogen or methyl; and**

$R_3$  is selected from  $-\text{OSO}_3^-$ ,  $-\text{R}_4\text{OSO}_3^-$ ,  $-\text{R}_4\text{OR}_5\text{SO}_3^-$ , and  $-\text{OR}_5\text{SO}_3^-$ ;

wherein R<sub>4</sub> and R<sub>5</sub> are each, independently, lower alkyl; to thereby analyze the sample by surface desorption ionization.

107. (Withdrawn) The method of claim 106, wherein the molecule is a biomolecule.

108. (Withdrawn) The method of claim 106 wherein the surface desorption ionization is MALDI-MS.

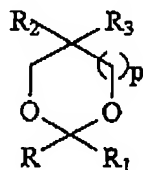
109. (Withdrawn) The method of claim 106 wherein the surface desorption ionization is DIOS.

110. (Withdrawn) The method of claim 106, wherein the surface desorption ionization is SELDI.

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111. (Withdrawn) The method of claim 106, wherein the surfactant is not degraded prior to analysis,
112. (Withdrawn) The method of claim 106, wherein the surfactant is degraded prior to analysis,
113. (Withdrawn) A method for enhancing chemical digestion of a biomolecule comprising: contacting the molecule with a digestive enzyme and a surfactant represented by formula I:



(I)

in which

p is 0, 1 or 2;

R is alkyl;

R<sub>1</sub> and R<sub>2</sub> are each, independently, hydrogen or methyl; and

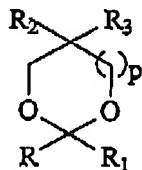
R<sub>3</sub> is selected from -OSO<sub>3</sub><sup>-</sup>, -R<sub>4</sub>OSO<sub>3</sub><sup>-</sup>, -R<sub>4</sub>OR<sub>5</sub>SO<sub>3</sub><sup>-</sup>, and -OR<sub>5</sub>SO<sub>3</sub><sup>-</sup>,

wherein R<sub>4</sub> and R<sub>5</sub> are each, independently, lower alkyl;

to thereby enhance the chemical digestion of the molecule.

Claims 114-116. (Cancelled)

117. (Withdrawn) A kit for enhancing chemical digestion of a biomolecule comprising: a surfactant represented by formula I:



(I)

in which

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p is 0, 1 or 2;

R is alkyl;

R<sub>1</sub> and R<sub>2</sub> are each, independently, hydrogen or methyl; and

R<sub>3</sub> is selected from -OSO<sub>3</sub><sup>-</sup>, -R<sub>4</sub>OSO<sub>3</sub><sup>-</sup>, -R<sub>4</sub>OR<sub>5</sub>SO<sub>3</sub><sup>-</sup>, and -OR<sub>5</sub>SO<sub>3</sub><sup>-</sup>,

wherein R<sub>4</sub> and R<sub>5</sub> are each, independently, lower alkyl; and instructions for use.

Claims 118-122. (Cancelled)

123. (New) The method of claim 1, wherein the biomolecule is selected from bovine serum albumin, lysozyme, ovalbumine, myoglobin, ubiquitin, and bacteriorhodopsin.